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ABSTRACT

This brief introduction to the use of audiotape recorders in educational settings provides basic information on operational procedures and recording techniques for voice, music, dubbing, and pulsing. Audiotape editing and splicing are also explained. (RAC)

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A Guide to Making an Audio Tape

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Introduction

Tape recorders are being used more widely in the field of education than ever before. The newer machines are lighter and easier to use. Everyone from school administrators to kindergartners can use the tape recorder.

The uses of the tape recorder in education are many. The record and playback capabilities of the tape recorder make it especially useful for speech therapy, dramatic practice, reports, recording special events or visitors, exchanging "letters" with other classes, giving directions, giving tests, or for an activity integrated into the classroom, and so on, as far as our imaginations can take us. One of the most up and coming ideas in education is to use audiotapes with another form of media, such as a bulletin board, slides, transparencies or super 8 films. These types of presentations are easily made by administrators and teachers as well as students.

How Does The Tape Recorder Work?

Sound is put on magnetic tape by reducing the sound to electrical impulses, amplifying the impulses and recording it on oxide coated tape. The heads of the tape recorder are electromagnets that send and receive magnetic impulses on the tape.

In recording, the electrical impulses pass through the heads and rearrange the oxide particles on the tape in a definite pattern for a given sound. The playback head simply "reads" the oxide patterns on the tape and translates them into electrical impulses that, when amplified, sound as they did when recorded.

On most tape recorders the tape passes by the erase head when the tape recorder is in the record mode, and the oxides on the tape are jumbled so they no longer represent any definable sound. The record head rearranges the oxide particles with a definite pattern to record a new sound on the tape. Preferably, in tape recorders there are three definite heads: an erase head, a record head and a playback head (Fig. 1). In some tape recorders there are only two heads; the record and playback are in the same head.

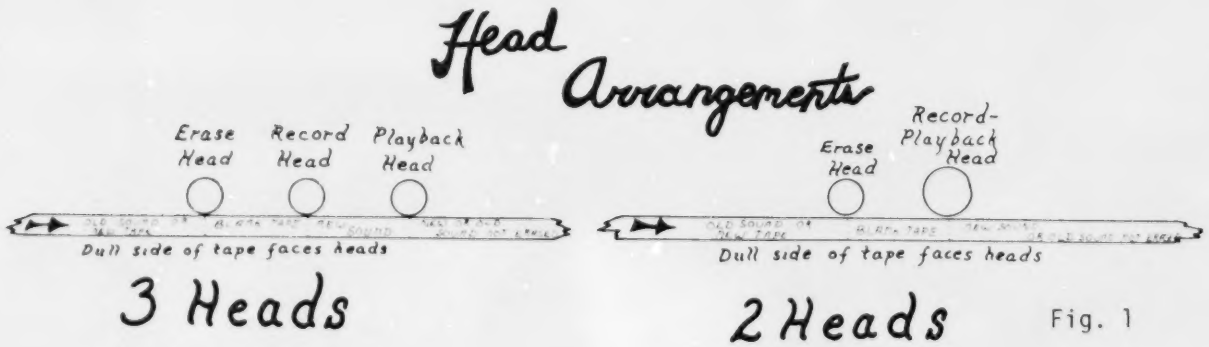


Fig. 1

Types of Tape Recorders

The most common types of tape recorders used in schools are cassette and reel-to-reel. Cassettes are small, simple to use, and the software for them is easy to store (Fig. 2). The reel-to-reel tape recorder offers greater flexibility in editing, the use of different tape speeds and often improved quality of recording (Fig. 3).

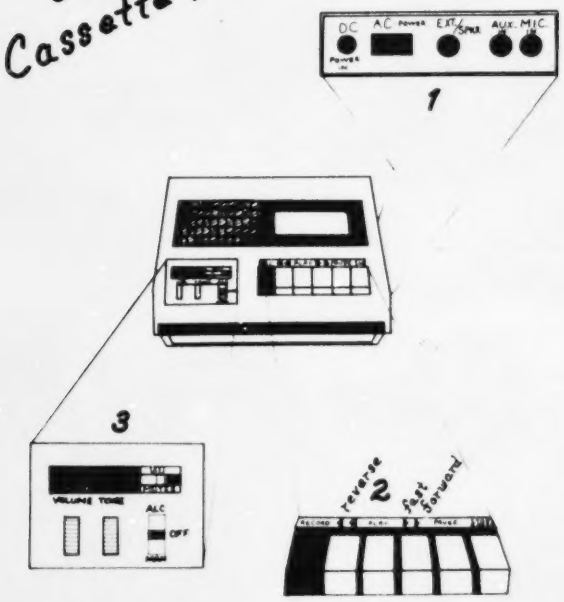
The standard cassette recorder has three major areas you can control. Area 1 houses all of the input, output and power jacks. Area 2 controls the functions of the tape recorder. Area 3 controls the quality of the sound and often contains a built in microphone.

AREA 1 contains connections for both AC and DC power inputs. Some models have permanent power cords and others have the portability afforded by battery power or both.

Standard audio tape recorders automatically erase the tape before recording new sound. Placing the recorder in the record mode automatically actuates the erase head, clearing the tape of sound before it reaches the record head.

When used for playback, the erase head is not in contact with the tape.

Standard Cassette Recorder Fig. 2



Most recorders have two input jacks. One is for an external microphone (when used, it cuts out the built-in microphone), and one is for an auxiliary input such as a record player, radio, or another tape recorder. Sometimes this input is designated "line in." A patch cord with the appropriate plug is used to join the two pieces of equipment.

The third jack is an output jack for the external speaker or earphone. This is used for connecting another speaker to the tape recorder (which cuts out the built in speaker) or for playing a tape into another piece of equipment via a patch cord. The same jack is sometimes referred to as "line out."

AREA 2 switches control all of the functions of the tape recorder. To load the tape recorder, press the stop/eject button (sometimes separate buttons). This opens the recorder so you can insert the cassette. If the tape is prerecorded, simply press the play button to hear the tape. To move the tape quickly to a midway point in the tape, depress the fast forward or cue button. To stop the tape for a few moments, but to keep the system activated, press the pause button. At the completion of the tape, press the rewind button.

On most cassette recorders it is necessary to depress both the record and play buttons to put the unit into the record mode. All others function the same as above.

After the tape has been rewound fully, depress the stop/eject button and remove the tape cassette.

AREA 3 controls the quality of the sound for both input and output. For playback it is simply a matter of adjusting the volume and tone controls so that listening may be done comfortably and clearly.

When recording, one option is to use the built in microphone. However, better results will generally be achieved through the use of a separate jacked in microphone or a direct line input from another source (i.e., record player, tape recorder).

The next decision is whether or not to use the automatic level control (ALC). The ALC activates a system which automatically sets the recording volume according to the prevailing sound levels. However, since these systems usually "key in" on the loudest sound, it is sometimes easy to miss what you most wanted to record. It is possible to override this system by flipping the switch to MAN (manual). This allows you to control the recording level with the volume control, the tone knob may or may not have any influence in the record mode depending upon the machine.

How do you know what is a proper recording level? Determine the proper recording level by using the VU meter (volume units). Putting the recorder into the record mode activates the VU meter, which stays activated even when the "pause" button is pressed. Now with the VU meter activated begin recording and watch the needle move; by adjusting the volume control you can position the needle. The best recording will result when the needle is high in the white zone, bouncing into the colored zone at the high points of the music. If the needle spends long periods of time in the colored zone, distortion will result. If the needle is too low in the white zone, there will be a hissing sound in the background of your recording. (If your recorder has no meter and no ALC/MAN switch, it is equipped with automatic level control. This is also sometimes known as AGC or automatic gain control.)

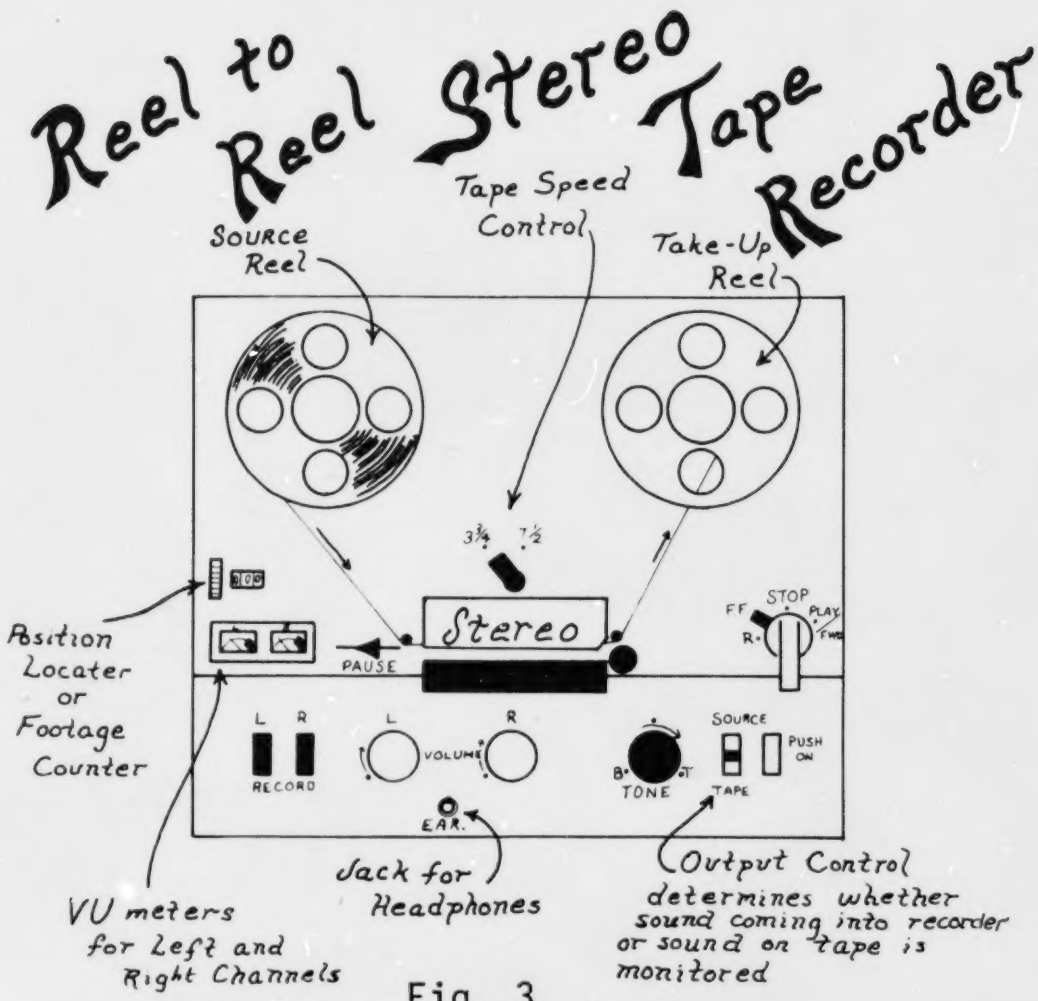


Fig. 3

A stereo reel-to-reel tape recorder also has an input/output panel. This panel is used in the same manner as that of a cassette recorder. However for each input or output there are two jacks, one for the left channel and one for the right. A single channel may be used for monophonic recordings, but both channels are generally used. (Fig. 3)

General Tips For Recording

1. Don't wear bracelets or other jewelry which will clank and rattle.
2. Record in a small area with sound absorbing material.
3. Place machines on tables separate from the microphone. This prevents the microphone from picking up the sounds of the motors.

4. Set the VU meter for your voice when recording a voice with music background with an open microphone.

5. Use patch cords whenever possible for cleaner recording. Use as few connections as possible.

6. Clean and demagnetize the recorder's heads before making a recording. This gives cleaner sound.

7. Bulk erase used tapes before rerecording on them, if possible.

8. Use the "pause" control to eliminate the pops and clicks caused by turning the recorder on and off. Put the recorder in "pause" before turning off and when changing music or stopping for any reason during recording.

9. Prevent feedback squeal by turning off the "monitor" capability. This is especially important when recording at high levels.

10. Make a test recording.

11. Be sure when mixing music and narration that the music style and volume are not distracting, as loud, catchy, vocal or popular music can be.

12. Eliminate dead spaces when making open microphone recordings by using the "pause" control while changing music or pausing to think. When mixing voice and music tracks, set the VU meter on the final tape recorder for the voice track.

Recording A Voice Track

1. Come prepared.

2. Type the script with wide spacing for easy reading.

3. Do not staple script pages together as they will rattle when turned.

4. Practice the script.

5. Use a sound-proofed room if possible.

6. Use a separate microphone rather than the built in microphone for improved sound.

7. Place the microphone away from the recorder, if possible in the next room. When too close, the microphone often picks up the noise of the recorder's motor and causes a squealing noise if too close to the amplifier. (Fig. 4)

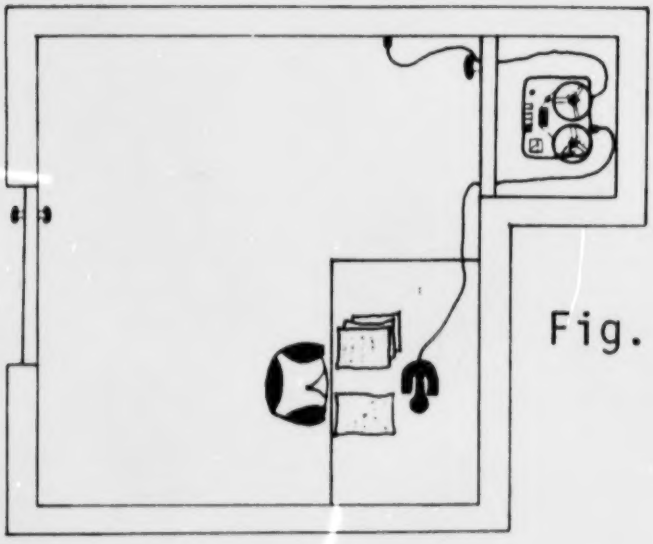


Fig. 4

8. Position the microphone about eight inches from your mouth and speak across it for the cleanest recording.

9. Make a test recording to check the volume. Record at the highest recording level possible to eliminate background hiss.

10. Record the narration.

11. Listen to the tape before you leave to be sure everything is right.

Adding A Musical Background

A Simple Recording Mix (Fig. 5)

1. Set up one tape recorder in the record mode with the "pause" control set. Use an external microphone.

2. Set up the music source (i.e., record player or tape recorder). Be sure these machines also have "pause" controls.

3. Take a meter reading for the voice.

4. Make a test recording to determine the proper voice/music mix (music simply played in the background while narrator speaks).

   a. Put music source in "pause" mode and cue the music to the proper starting point.

   b. Start music and tape recorder by releasing "pause" controls.

   c. Fade up the music to a good listening level for introduction, then fade down to background level.

d. Begin your narration.

e. While narrating, pause at appropriate spots for two seconds to allow time for slide changes.

Fig. 5

Simple set up for open mike recording, music background

f. Record audible signal to indicate slide change during two second pause by striking a pleasant sounding object.

g. Continue with the narration.

5. Make actual recording following steps A through G above.

6. For several musical changes:

   a. Come to the end of a phrase or paragraph in the narration.

   b. Fade the music down slightly.

   c. Place the recorder on "pause."

   d. Cue the next musical selection.

   e. Start the music.

   f. Release the "pause" control on the recorder.

   g. Fade up the music.

   h. Begin to narrate again.

7. At the conclusion of the narration, fade up the music and allow to play a few seconds then fade it out at an appropriate place in music. Press "pause" control on the recording tape recorder, then shut it off.

Advanced Recording Mix

1. Record the voice track.

   a. Use a monaural reel-to-reel tape recorder.

   b. Follow steps in Part 4--Recording of Voice Track.

2. Record music.

   a. To use one musical selection it is not necessary to record it onto tape. Cue the selection on the record player and proceed to mix as in section C below.

   b. To use two or more pieces of music, prerecord them in the order they will be needed on one tape. If you want each selection to fade into the other:

      1) Use two tape recorders.

      2) Prerecord odd numbered pieces on one recorder (recorder "A").

      3) Prerecord even numbered pieces on another recorder (recorder "B").

      4) Play recorder A, and at the same time cue recorder B to fade into the master music tape.

3. Mixing music and voice tracks. There are a variety of ways to mix the tracks:

   A. Stereo Reel-to-Reel Tape Recorder (Fig. 6)

      1) Patch music track into channel one (tape recorder or record player as source).

      2) Patch voice track into the other channel.

      3) Cue the music and voice tracks.

      4) Place the master mix recorder in the record mode and put the "pause" control on. The recording process can be monitored with headphones plugged into the master mix recorder.

      5) Start each track at the appropriate time and release the "pause" control on the master mix recroder.

6) Control the mix by using the separate volume controls for each channel on the master mix recorder. When you want the music to come in strong, raise the volume for that channel; when you want it to fade out, turn the volume down. It is usually best to keep the voice track constant, fading the music in and out. DO NOT CHANGE THE VOLUME CONTROLS ON YOUR SOURCES AFTER YOU HAVE SET THE VU METER FOR THEM.

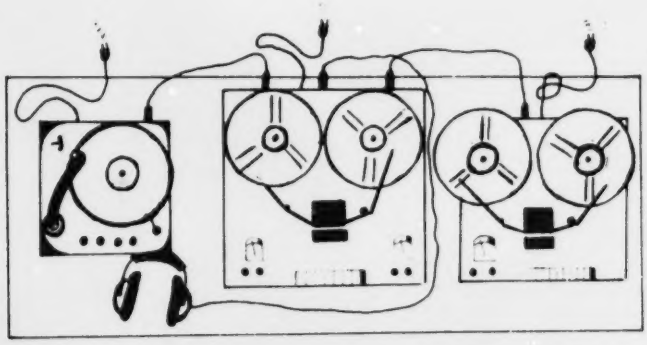


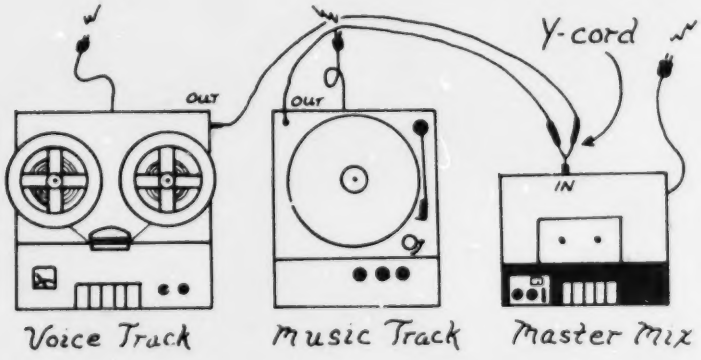
Fig. 6

Y-Cord to Cassette or Reel-to-Reel Tape Recorder for Final Tape Recording (Fig. 7)

1. Patch the music track into one branch of the Y-cord adapter which is plugged into the master mix recorder (from tape recorder or record player as source).

2. Patch the voice track into the other end of the Y-cord adapter (this would come from another tape recorder).

Fig. 7



3. Cue music and voice tracks.

4. Place the master mix recorder in the record mode and turn on the "pause" control.

5. Start each track at the appropriate time and release the "pause" control on the master mix recorder.

6. Control the mix by using the volume controls on the music and voice sources. The VU meter can be set for the voice track and the voice track be kept constant, while the music track can be faded up or down as appropriate.

Mixing Block (Fig. 8)

1. Patch the voice track into one input of the mixing block.

2. Patch the music source into another input of the mixing block (If more than one music source is to be used, use as many inputs as necessary.)

3. Connect the master mix recorder to the output jack of the mixing block.

4. Cue the music and voice tracks.

5. Place the master mix recorder in the record mode and put the "pause" control on.

6. Start each track at the appropriate time and release the "pause" control on the master mix tape recorder.

7. Control the mix by using the volume controls on the mixing block. Again, you can set the VU meter on the master mix recorder for the voice track and fade the music in and out as appropriate.

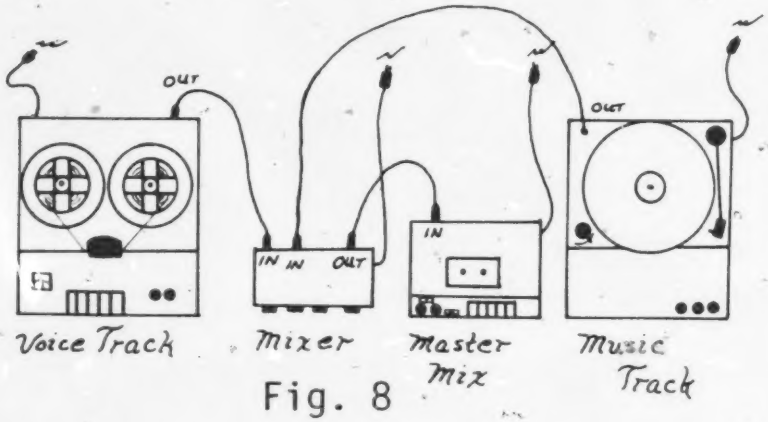


Fig. 8

Dubbing and Pulsing

1. Transfering sound from one tape to another is dubbing.

   a. Patch the master tape recorder from the line output or speaker jack with a patch cord into the line input jack on the recorder where the final tape will be made.

   b. Put the master tape recorder in the playback position and cue the tape, put the tape recorder on pause.

   c. Put the final tape recorder in the record mode and on pause.

   d. Record the tape, taking the same precautions as when making a regular recording. Make sure that the VU meter is as high as it can go without going into the colored area.

   e. Punch out the plastic tabs on the back of the finished cassette tape to make sure the finished tape will not be rerecorded (Fig. 9).

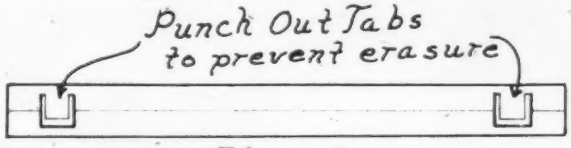


Fig. 9

2. Pulsing:

Many cassette and stereo tape recorders have a silent signal that will advance your slide program when the tape recorder is patched to a carousel projector. The inaudible signal is put on the unused track of the stereo tape recorder and on special cassette tape recorders that have a programming device.

   a. To put the pulse on the tape:

      1) Set the pulsing device to the record mode.

      2) Play the tape and listen to it normally.

      3) Push the pulsing button to put the inaudible signal on the tape for each slide change.

      4) Rewind the tape, when all the signals are on it, put the pulsing in the playback mode and play the tape with the slide projector connected to check timing.

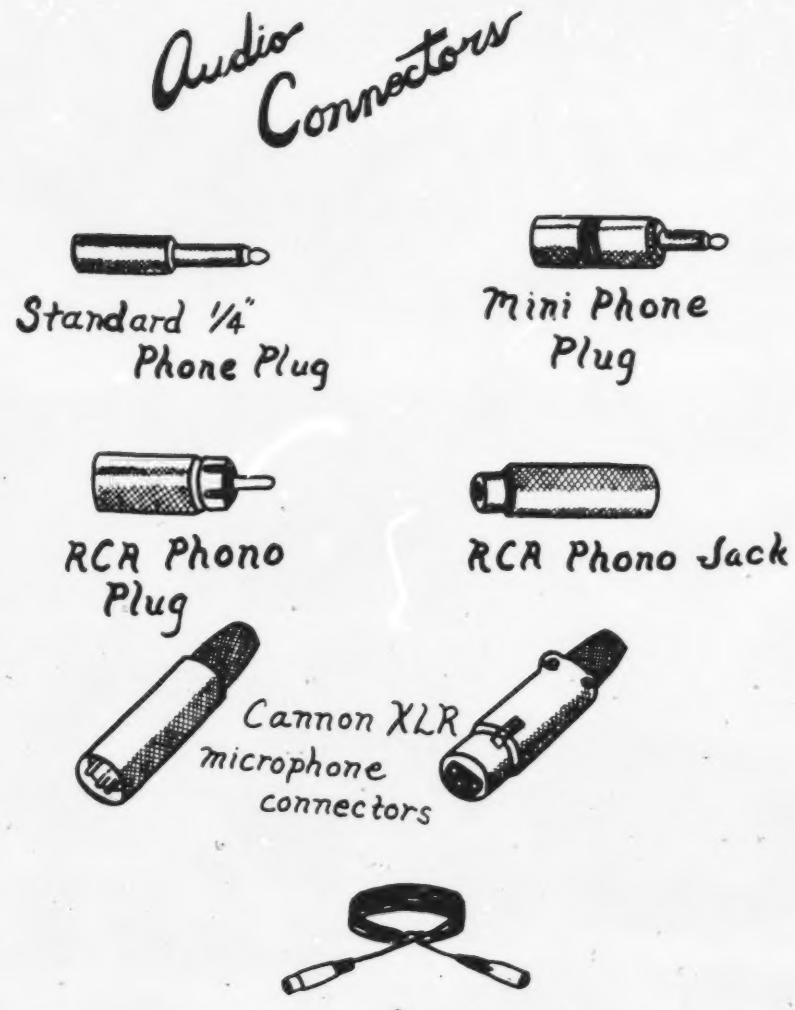


Fig. 10

Audio Connectors and Adapters

Audio adapters and connectors come in two parts, the male "plug" and the female "jack." There are several common types of jacks and plugs: the standard 1/4 inch phone, mini phone, RCA phono and Cannon XLR microphone (Fig. 10).

Audio Connectors: Audio connectors are found in two forms; installed in a piece of equipment or on the ends of a cord or cable used to connect two pieces of equipment. This connector wire is generally referred to as a "patch-cord." Patch cords use two basic types of wire; shielded cable and unshielded wire. Shielded cable is generally round and should be used to carry signals between pieces of equipment or from a microphone. Unshielded wire is generally a flat two strand cord similar to lamp cord and is acceptable for connecting speakers to amplifiers etc. (Fig. 10)

Audio Adapters: Often you will be confronted with the problem of noncompatible audio connectors i.e. a tape recorder with a standard phone jack input and a patch cord with RCA phono plugs to connect it with your record player. A problem such as this can be solved through the use of an adapter. Adapters are made for almost any situation: to convert connectors of one style to another style, to convert from male to female or vice versa and Y-cords or splitters which may do any of the above while at the same time doubling the capacity of any output or input. (A Y-could be used to mix the sound from two recorders to a third or to record two copies from a third machine simultaneously.) (Fig. 11)

Fig. 11

MECHANICAL TAPE EDITING (for open reel tapes)

1. Play back your tape, listing the corrections to be made by location (see footage counter).

2. Replay the tape stopping at listed spots (use the pause control).

3. Cue up the exact spot (this is done by moving the tape manually across the heads).

4. Mark the spot(s) to cut with a grease pencil on the shiny or base side of the tape (removal of a section will require two cuts, mark both beginning and end of faulty section before cutting). (Fig. 12)

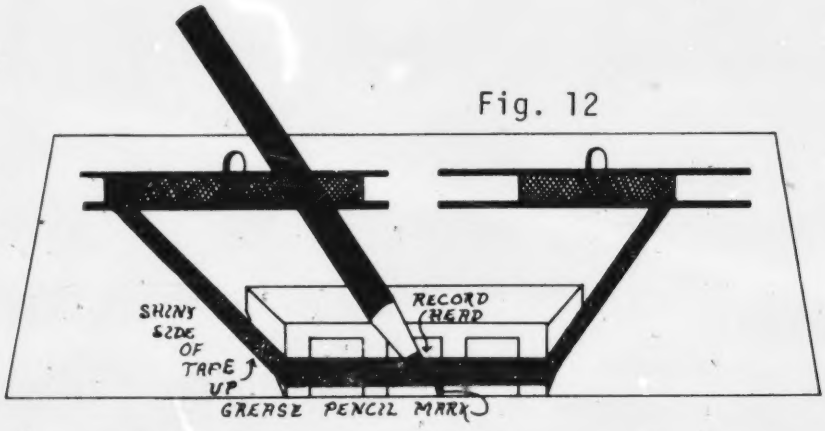


Fig. 12

5. Pull a loop of tape from the recorder and place it in the splicing block; line up the grease pencil marks with the diagonal cutting guide.

6. Cut the tape along the diagonal cutting guide and wipe off the grease pencil mark. Add the tape being inserted, if you're removing a section of tape, cut at both ends and remove the unwanted section. (Fig. 13)

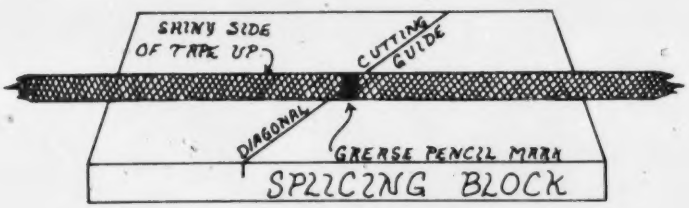


Fig. 13

7. Splice the ends together (see next section). Often when editing a tape it is a good idea to make a copy and save your original as a master.

TAPE SPLICING

1. Overlap the broken ends of the tape in the splicing block at the diagonal cutting guide, be sure the shiny side of the tape is facing up.

2. Using a sharp razor blade cut through both pieces of tape along the diagonal cutting guide (a diagonal cut is less likely to catch or make a pop). (Fig. 14)

Fig. 14

3. Brush away excess piece of the upper tape, and wipe off any marks, make sure the tape ends are tightly butted.

4. Cover the cut with splicing tape and burnish smooth. (Fig. 15)

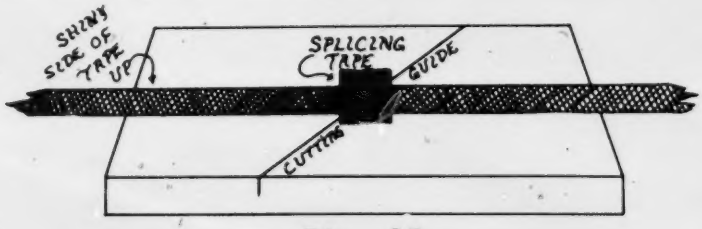


Fig. 15

5. Trim off the excess tape by running the razor blade along the edges of the tape track. (Fig. 16)

If the splice is done properly it should be unnoticeable in playback.

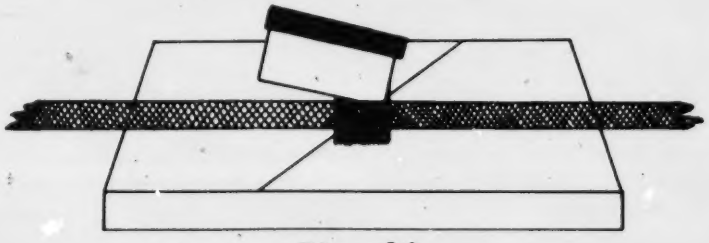


Fig. 16